Japanese Patent Application Laid-open Publication

Japanese Patent Application Laid-open Publication Hei 1-176362
Published: July 12, 1989
Title of the Invention: Disk Loading Apparatus
Japanese Patent Application No.: Sho 62-334511
Filed: December 29, 1987
Inventors: Sukeyuki NAKAMURA et al
Applicant: Matsushita Electric Ind. Co. Ltd. Osaka, Japan

Specification

1. Title of the Invention

Disk Loading Apparatus

2. What is claimed is:

A disk loading apparatus comprising a loading tray for carrying a disk placed on the loading tray into a housing of the apparatus, a traverse composed of an optical pick-up and a turntable, a clamper rotatably secured to a stationary member for clamping the disk onto said turntable, a rotating member formed as a cantilever and being supported rotatably toward a disk plane, said traverse being held by said rotating member, and an lifting member for moving said rotating member about a rotation center toward the disk plane.

3. Detailed Explanation of the Invention

Applicable Field in Industry

The present invention relates to a disk loading apparatus for loading a disk-like information record medium such as a compact disk into a housing of the apparatus to read out contents stored in the record medium.

Prior Art

In a known disk loading apparatus, in response to a placement of a disk on a tray, a disk holder moves downward to place the disk on a turntable arranged below the disk holder, and at the same time, a disk clamper is moved downward to clamp the disk on the turntable.

A known disk loading apparatus will be explained with reference to drawings.

Figs. 7 and 8 are front views showing a known disk loading apparatus, Fig. 7 depicts a disk loading condition and Fig. 8 illustrates a disk playing condition. 1 denotes a housing, 2 a loading tray, and 3 denotes a disk holder holding the disk. After the loading tray 2 has been installed in the housing 1, the disk holder 3 moves downward. 5 represents a turntable, 6 a clamper arm, and 7 denotes a clamper formed by a magnet to push the disk against the turntable 5. The clamper arm 6 is rotatably secured to the housing 1 and is moved up and down in conjunction with the movement of the loading tray 2 or by means of a up-down motor (not shown) for moving the clamper arm up and down. 8 denotes a traverse which is composed of an optical pick-up (not shown), turntable 5 and others, and is secured to the housing 1.

Now an operation of the disk loading apparatus having the above mentioned construction will be described.

At first, the disk 4 is placed on the loading tray 2 (see Fig. 7). In this condition, the disk holder 3 is in an upper position above the loading disk 2 and the clamper arm 6 is also in an upper position. Then, when the loading tray 2 is moved into the housing 1, the disk holder 3 is moved downward in conjunction with the movement of the loading tray 2 and the disk 4 on the disk holder descends and is placed on the turntable 5. At the same time, as shown in Fig. 8, the clamper arm 6 is moved toward the disk 2 to clamp the disk.

Problems to be Solved by the Invention

In the known disk loading apparatus, it is necessary to provide a mechanism for moving the disk holder up and down within loading tray, and the loading tray is divided into two parts, a tray main body and a disk holder. Therefore, a mechanical strength of the loading tray is liable to be weak, and if a mechanical strength is increased, the tray is liable to be large in size and a thickness of the tray is liable to become thick. The number of parts is liable to increase. Moreover, since the clamper arm formed as a cantilever is moved up and down, the clamper arm also is liable to be large in size and thick in thickness. Furthermore, The clamper arm might be vibrated upon the operation of the clamper and a rather complicated mechanism for moving the clamper arm is required. In this manner, the known disk loading apparatus has various problems such as a large number of parts and increase in cost.

The present invention has for its object to provide a disk loading apparatus which can simplify the loading tray and clamper arm, can reduce the number of parts and cost whilst a sufficiently high mechanical strength, small size and a thin thickness can be attained.

Means for Solving the Problems

According to the invention, a disk loading apparatus comprises a rotating member formed as a cantilever and being supported rotatably toward a disk plane, said traverse being held by said rotating member, and an lifting member for moving said rotating member about a rotation center toward the disk plane.

Function

According to the invention, the cantilever type rotating member which supports the traverse and is arranged rotatably is moved up and down with respect to the disk surface by means of the up and down mechanism, and thus the disk is moved upward by the turntable provided on the traverse and then the disk is further moved upward into such a position that the disk is clamped onto the turntable by means of the clamper. Therefore, according to the invention, it is no more necessary to provide the loading tray having the double structure for moving the up and down, and at the same time it is not required to provide the up and down mechanism for moving the clamper art up and down. In this manner, the apparatus can be simplified in structure, small in size, thin in thickness and cheap in cost.

Embodiments

Now an embodiment of the disk loading apparatus according to the invention will be explained with reference to the drawings.

Fig. 2 shows the disk loading apparatus according to the invention in a condition that a loading tray is pulled out of a housing. In Fig. 2, 11 denotes a main housing, 12 a loading tray, and 13 represents a disk. The loading tray 12 is installed into the housing 11 by means of guide pieces 14a-14f. 15 denotes a loading motor, 16 a motor gear, 17 speed reduction gears A, and 18 shows speed reduction gears B. 19 is a driving rack which is engaged with a smaller diameter gear of the speed reduction gears B 18. The driving rack 19 is arranged to be slidable along a rear surface of the loading tray 12 and a driving gear 20 is provided on the driving rack. The driving gear 20 is engaged with a tray rack 12a formed on the rear surface of the loading tray 12.

Fig. 1 is a front view illustrating the disk loading apparatus during the disk loading. In Figs. 1 and 2, 21 is a traverse, 22 is an optical pick-up for reading an optical signal, 23 a turntable, and 24 denotes a spindle motor for rotating the turntable. The traverse 21 is provided on a cantilever type rotating member 27 by means of loading rubbers 25, said rotating member being arranged movable about an axis 26. An up and down pin 28 is secured to a front end of the rotating member 27 by means of clamping, said up and down pin being engaged with an lifting member 29. The lifting member 29 has formed therein a rack portion which is engaged with the above mentioned driving gear 20. The rack portion is slidable on the housing 11, and the up and down pin 28 is engaged with an inclined portion formed in the rack portion such that the rotating member 27 is moved up and down. 30 denotes a driving control lever which is driven in the anti-clockwise direction by means of a spring 31. Lock portions 30a and 30b formed in the lock lever 30 are engaged with the rack portion of the lifting member 29 and the tray rack 12a, respectively.

32 denotes a clamper which is rotatably secured on a clamper arm 11a provided on the housing 11, the clamper serving to claim

the disk 13 onto the turntable 23. 33 depicts a switch for detecting a installation of the loading tray and 34 represents a switch for detecting a discharge of the loading tray.

Now the operation of the disk loading apparatus constructed in the manner explained above will be described with reference to Figs. 1-6.

Figs. 3 and 4 are plan views illustrating a condition in which the loading tray has been installed within the housing and show internal structural elements. Fig. 3 shows a condition in which the disk is not clamped, i.e. the traverse is not move upward, and Fig. 4 depicts a condition in which the disk has been clamped by means of the ascending traverse. Fig. 5 is a front view of the condition shown in Fig. 4 and Fig. 6 is a side view of the condition of Fig. 4.

In Fig. 2, the disk 13 is placed on the loading tray 12, and then the loading tray installing operation is started. Then, the loading motor 15 is driven and the driving rack 19 is moved into the housing 11 by means of the motor gear 16, speed reduction gears A 18 and speed reduction gears B 19. During this operation, the driving gear 20 provided on the driving rack 19 is rotated and moved toward the housing together with the driving rack. In this case, the driving gear 20 is engaged with both with the tray rack 12a and the rack portion formed on the lifting member 29. However, the rack portion of the lifting member 29 is not moved, because the lifting member 29 is locked by the driving control lever 30. In this manner, in response to the movement of the driving rack 19, only the driving gear 20 is rotated and the tray rack 12a and thus the loading tray 12 is moved into the housing 11.

In Fig. 3, when the loading tray 12 has been installed into the housing 11, the driving rack 19 has been moved into a position shown in the drawing. Then, an inclined front portion 30c of the driving control lever 30 is pushed by a center axis 20a of the driving gear 20 and the driving control lever 30 is rotated in the clockwise direction against the spring 31. Then, the engagement of the lifting member 29 and the lock portion 30a of the driving control lever 30 is released and the locking condition of the lifting member is released. At the same time, the lock portion 30b of the driving control lever 30 is engaged with the tray rack 12a and the loading tray 12 is locked. In this condition, as shown in the front view of Fig. 1, the traverse 21 is not driven into a condition to clamp the disk. That is to say, the up and down pin 28 is not driven into an upper position, because the lifting member 29 is not driven.

Next, the operation will be explained with reference to Figs. 4, 5 and 6. When the loading motor 15 is further rotated from the condition shown in Fig. 3, the driving rack 19 is driven by means of the speed reduction gears B 18, and the lifting member 29 is driven by means of the speed reduction gears B 18, because the loading tray 12 is locked. The lifting member 29 is moved into a position to push the installation detecting switch 33 and is stopped thereat. That is to say, in the side view of Fig. 6, when the lifting member 29 is moved, the up and down pin 28 provided at the front end of the rotating member 27 engaging with the inclined portion 29a of the lifting member 29 is moved upward. As shown in Fig. 5 showing a front view of this condition, the disk 13 is pushed upward by means of the turntable 23 and is left from the loading tray 12. The disk 13 is further moved upward into a position that the clamper 32 is pushed upward by the disk 13. Then, the clamper 32 is left from the clamper arm 11a and is rotated together with the disk 13.

The description so far explained is the installation of the disk, and an operation for discharging the disk out of the housing may be done in a completely opposite order.

As explained above, according to the present invention, by providing the cantilever type rotating member which supports the traverse and is arranged rotatably is moved up and down with respect to the disk surface and the lifting mechanism for rotating the up and down member about a rotational axis, it is no more necessary to provide the loading tray having the double structure for moving the disk up and down, and at the same time it is not required to provide the up and down mechanism for moving the clamper art up and down and the clamper arm can be stationary.

In the embodiment explained above, the clamper arm 11a is formed by a cantilever type stationary member which is formed as an integral body with the housing 11, but according to the invention, the clamper arm may be formed by a member whose both ends are secured to the housing to increase a mechanical strength.

Merits of the Invention

As explained above, according to the invention, by providing the cantilever type rotating member which supports the traverse and is arranged rotatably is moved up and down with respect to the disk surface and the lifting mechanism for rotating the up and down member about a rotational axis, it is no more necessary to provide the loading tray having the double structure for moving the disk up and down, and at the same time it is not required to provide the up and down mechanism for moving the clamper art up and down. Therefore, the disk loading apparatus can be simplified in structure, thin in thickness, cheap in cost and can have a large mechanical strength.

4. Brief Description of the Drawings

Fig. 1 is a front view showing a disk loading operation of an embodiment of the disk loading apparatus according to the invention; Fig. 2 is a plan view illustrating a disk tray discharging operation; Fig. 3 is a plan view showing an internal structure in a condition that the loading tray is inserted but the traverse is not move upward; Fig. 4 is a plan view in which the traverse is moved from the position shown in Fig. 3 into an upper playing position; Fig. 5 is a front view of Fig. 4; Fig. 6 is a side view of Fig. 5; Fig. 7 is a front view showing a disk loading operation of a known disk loading apparatus; and Fig. 8 is a front view a disk playing condition after the disk has been clamped.

12···loading tray, 13···disk, 21···traverse, 23···turntable, 27···

rotating member, 29···lifting member, 32···clamper